

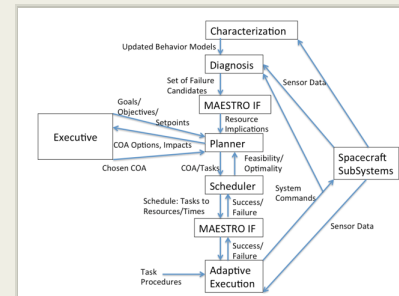
# Intelligent, Autonomous Electrical Power System Management and Distribution, Phase I

Completed Technology Project (2017 - 2018)



## Project Introduction

EPS-MAESTRO (EPS Management through intelligent, Adaptive, autonomous, fault identification and diagnosis, Reconfiguration/replanning/rescheduling Optimization) substantially leverages previous NASA investments to assemble the correct set of technologies to implement all aspects of the intelligent, autonomous EPS manager. We have significant experience in all required technologies and have already integrated them into a general MAESTRO architecture designed to be easily applied to spacecraft subsystems. Montana State University (MSU) has designed, built, launched, and operated several satellites and has specifically studied in-space PV degradation. In addition to providing substantial knowledge, expertise and practical experience, MSU will also provide real satellite telemetry data and set up a laboratory hardware testbed, using spare MSU satellite hardware, for testing our EPS-MAESTRO prototype in Phase I. They also plan to field an actual EPS-MAESTRO prototype onboard one of their future satellites, in-space, during Phase II. The eventual, ultimate goal is the ability of an onboard autonomous intelligent system to manage the spacecraft EPS itself through the development of EPS-MAESTRO, which can be easily adapted to the EPSs of different spacecraft. EPS-MAESTRO must be sufficiently powerful, general, and computationally efficient and be easily adapted by developers. This will be accomplished using open standards, clearly defined open interfaces, use of Open Source software, and leveraging several previous NASA investments. Phase I research goals are to explore the spacecraft EPS management domain for small satellites and large manned spacecraft, elaborate the AI techniques useful for EPS characterization, diagnosis, replanning/rescheduling/adaptive execution/safing, prove the feasibility of these techniques through prototype development (by prototyping two applications), and develop a complete system specification for the Phase II EPS-MAESTRO system.



Intelligent, Autonomous Electrical Power System Management and Distribution, Phase I Briefing Chart Image

## Table of Contents

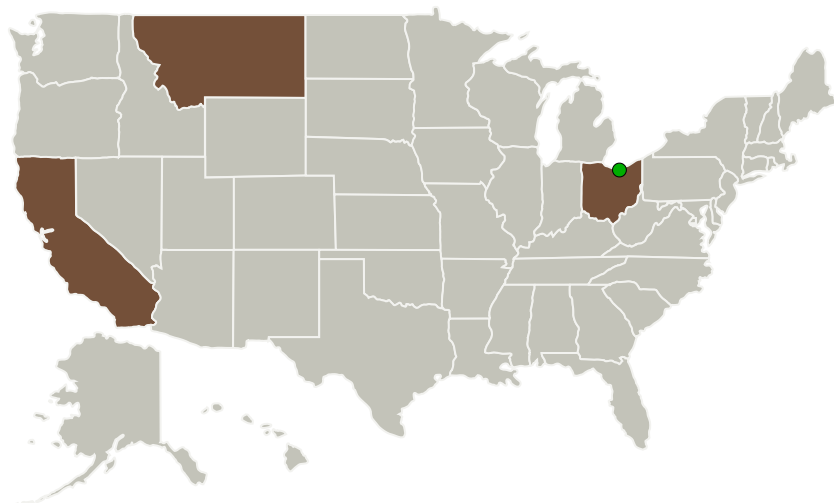
Project Introduction	1
Primary U.S. Work Locations and Key Partners	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	2
Images	3
Technology Areas	3
Target Destinations	3

## Intelligent, Autonomous Electrical Power System Management and Distribution, Phase I

Completed Technology Project (2017 - 2018)



## Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Stottler Henke Associates, Inc.	Lead Organization	Industry	San Mateo, California
● Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio
Montana State University - Bozeman	Supporting Organization	Academia Alaska Native and Native Hawaiian Serving Institutions (ANNH)	Bozeman, Montana

## Primary U.S. Work Locations

California	Montana
Ohio	

## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Organization:**

Stottler Henke Associates, Inc.

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

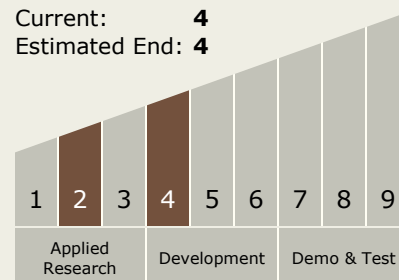
Carlos Torrez

**Principal Investigator:**

Richard R Stottler

## Technology Maturity (TRL)

Start: 2  
 Current: 4  
 Estimated End: 4

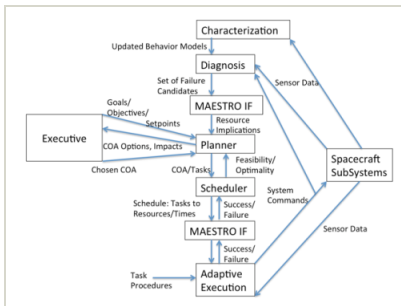


# Intelligent, Autonomous Electrical Power System Management and Distribution, Phase I

Completed Technology Project (2017 - 2018)



## Images



### Briefing Chart Image

Intelligent, Autonomous Electrical Power System Management and Distribution, Phase I Briefing Chart Image  
(<https://techport.nasa.gov/image/132056>)

## Technology Areas

### Primary:

- TX03 Aerospace Power and Energy Storage
  - └ TX03.3 Power Management and Distribution
    - └ TX03.3.1 Management and Control

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System